

Appln No. 09/863,778

Amdt date February 4, 2004

Reply to Advisory action of January 14, 2004

REMARKS/ARGUMENTS

Claims 1 to 18 are pending in the current application as amended by Applicant's response of December 5, 2003.

Further to Applicant's response of December 5, 2003, the Examiner has again rejected all of claims 1 to 18. The Examiner put forth three grounds of rejection in his Advisory Action.

- That the apparatus shown does not "rigorously attempt any corrections for delays in hardware and is not shown using strictly controlled electrical circuitry or hardware, suggesting a casual approach by Application that would be impossible for achieving the accuracy needed."
- That the "clock embodiments do not include corrections for the motion of the solar system, the galaxy, or its local cluster to normalize any motion vector."
- That the literature "does not support absolute conclusion that 'superluminal' phenomena takes place."

Applicant assumes based on the Examiner's response that all other previous objections and rejections have been addressed adequately by Applicant in the previous responses. Applicant will now address these objections, noting for the record that the accuracy and literature objections as currently framed are newly raised by the Examiner.

RESPONSE TO ACCURACY OBJECTION

First, the Examiner disputes that the apparatus described in Applicant's application is capable of the accuracy necessary to measure the vector velocity of light.

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As an initial point, Applicant is operating under the assumption that the Examiner is no longer requiring proof that femtosecond accuracy is needed to determine tunneling time. As is explicitly taught in Applicant's specification, and repeatedly argued in previous responses, the apparatus of the current invention uses radio wave transmissions, not light transmissions, to measure tunneling time. As a result, the wavelength of the transmission is much longer and the accuracy needed to measure the tunneling time is decreased from femto to picoseconds.

With regard to the Examiner's objection concerning the "components" of the apparatus for measuring in picosecond timeframes Applicant respectfully traverses this rejection. Indeed, Applicant finds this rejection puzzlingly in the extreme. The timing components of the apparatus were carefully selected by Applicant and include a Phillips Scientific 417 Nuclear Instrumentation Standard Pocket Pulser having a rise time of nanoseconds; a Textronix (TDS 220) oscilloscope having a 100 MHz or (10 ns) timescale resolution, an ORTEC 9308 Picosecond Time Analyzer having a temporal resolution of picoseconds for times from nanoseconds to microseconds, and an ORTEC 9307 pico-Timing Discriminator having a time resolution of picoseconds for pulse widths from 5 ns to hundreds of picoseconds. It should be noted that data on these devices is widely available from the manufacturers, and that one of skill in the art of signal processing would clearly have the knowledge base to recognize the need to have components, such as those exemplified in Applicant's specification, capable of picosecond

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time resolution. The remaining components are merely amplifiers, cables and antennas for boosting and transmitting the signal. Nowhere does the Examiner specifically point to a component that would be incapable of the picosecond measurements required by Applicant's device and method.

Indeed, once again the Examiner has, without support and specificity, objected to the overall construction of the device. As a result, Applicant must once again point out that under MPEP §2107.02(IV) it is well-established that the initial burden to prove a lack of utility is on the Examiner. The rejection itself must contain: "(A) An explanation that clearly sets forth the reasoning used in concluding that the asserted utility for the claimed invention is neither both specific and substantial nor well-established; (B) Support for factual findings relied upon in reaching this conclusion; and (C) An evaluation of all relevant evidence of record, including utilities taught in the closest prior art."

Here the Examiner asserts without any factual evidence that Applicant's apparatus is incapable of measuring tunneling times in the picosecond regime. The Examiner continues to discount the data provided in the specification and Applicant's August 22, 2003 Amendment, both of which detail the measurement of tunneling times in the picosecond regime using Applicant's claimed apparatus.

Accordingly, Applicant requests reconsideration and withdrawal of this rejection. Absent such a withdrawal Applicant requests an explicit and specific statement from the Examiner as to why Applicant's apparatus, in light of the

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substantial experimental data supplied with the application, lacks utility, and what evidence if any would be sufficient to persuade the Examiner of its ability to function as described.

RESPONSE TO CLOCK EMBODIMENT REJECTION

The Examiner also rejected the "clock embodiments" because the application does not provide corrections for the relative motion of the solar system, the galaxy, or its local cluster. Again, Applicant suggests that the Examiner does not fully understand the nature of the oscillation measurement being taken by Applicant's device.

First, Applicant again points to the specification, which explicitly addresses this concern. For example, the specification states that:

"Fig. 8 shows a measurement of the daily oscillation of the tunnel time, which is equivalent to the change in the vector vacuum velocity of light with tunneling direction. This tunneling direction is in turn equivalent to the cosmic background dipole direction created by the Doppler shift caused by the Earth's motion."

(Specification, page 14 , lines 6 to 9.)

In short, the specification teaches that since the cosmic microwave background radiation has a constant direction in relation to the Earth, the solar system within which the Earth orbits, the Galaxy within which the solar system moves, and even the local cluster, taking tunneling time measurements over a single day measures, by necessity, the cosmic microwave background radiation dipole (i.e., the red shift and blue shift). In turn, by comparing the values obtained throughout the day an oscillation will be observed having a minimum and a

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maximum which will correspond to the red and blue shifts in the cosmic microwave background radiation. (Specification, page 14 , line 6 to page 15, line 35.) It is indeed the motion of the Earth, the solar system, and the galaxy relative to the cosmic microwave background radiation that is required to obtain the oscillation indicative of the direction of the cosmic microwave background radiation. (A thorough discussion of the procedures necessary to ensure that the Earth's motion is properly taken into account in the measurement is provided in the specification from page 14, line 6 to page 15, line 34. In addition, Applicant has provided a tutorial concerning how one uses the dipole of the cosmic background radiation created by the movement of the Earth relative to the cosmic background radiation starting at page 30 of the 8/22/03 Amendment.)

Applicant respectfully submits that one of ordinary skill in the art having read the detailed disclosure provided would have no problem in operating Applicant's apparatus as a cosmic clock and calendar taking into account the motion of the Earth knowing the cosmic rest frame, which is set forth in the disclosure, and described in detail starting at page 14, line 11 of the specification. Accordingly, Applicant respectfully requests withdrawal of this rejection.

RESPONSE TO LITERATURE SUPPORT REJECTION

Finally, the Examiner states that the "literature does not support absolute conclusions that 'superluminal' phenomena takes place". The Examiner contends that because "causality" is maintained that in fact the wavegroup never exceeds the speed of

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light. Applicant does not dispute this point. Indeed, Applicant has repeatedly stressed in all of his filings that the Applicant's measurement does not violate causality.

However, Applicant contends that information can be obtained by observing the wave shape and energy transfer effects of tunneling on the wavepacket. In fact, in Applicant's Amendment dated August 22, 2003, Applicant states, "[i]n summary, the classical electromagnetic superluminal energy pulse cannot get past its luminal wavefront and is superluminal only inside the wavepacket" (8/22/03 Amendment, page 26, 1st paragraph of inset.) It is in fact the group velocity, of the peak of the wavepacket which Applicant measures, and it is this value that is superluminal. Such a measurement of the classical group velocity of a wavepacket, and the fact that this classical group velocity can exceed the speed of light is the phenomenon that Applicant's use in the current invention to determine the direction of the cosmic background radiation. And that group velocities can exceed the speed of light are fully supported by the literature, including the Chiao reference, which states in its opening sentence, "[e]xperiments have shown that individual photons penetrate an optical tunnel barrier with an effective group velocity considerably greater than the vacuum speed of light." (Chiao, Abstract, underlining added for emphasis.)

Accordingly, Applicant's see no reason behind the Examiner's rejection. Nowhere in the claims or the specification of the application do Applicant's describe, teach, or even suggest that Applicant's apparatus could actually generate wavefront velocities greater than the speed of light,

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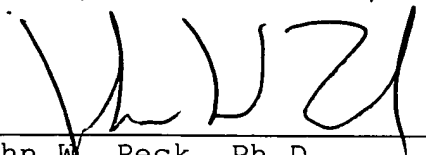
or that the transmissions of the device could somehow be used to transmit information faster than the speed of light, thereby violating causality. Indeed, Applicant has taken pains in the claims to specify that the device measures "group velocity", and in the specification to stress that causality is not violated by the device.

Accordingly, Applicant respectfully submits that utility of the apparatus, as claimed by Applicant has been both well-established, and sufficiently described by both the theoretical discussion and the actual data supplied in the filed specification, and respectfully requests withdrawal of this grounds of rejection.

CONCLUSION

In view of the foregoing remarks, reconsideration and allowance of this application are respectfully requested. However, the Examiner is kindly requested to call the undersigned attorney if he should deem any claim presently in the application unpatentable.

Respectfully submitted,
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